Computer Literacy

Introduction: History, Uses, Issues

PLATO

EDUCATIONAL SOFTWARE

CONTROL DATA

IMPORTANT: PLEASE READ BEFORE USING THIS PRODUCT

CONTROL DATA PUBLISHING COMPANY, INC.
LICENSE AGREEMENT
SOFTWARE DISK PRODUCT

THIS SOFTWARE DISK PRODUCT IS LICENSED BY CONTROL DATA PUBLISHING COMPANY, INC. ("CONTROL DATA") TO ITS CUSTOMERS FOR THEIR USE ONLY, ON THE FOLLOWING TERMS AND CONDITIONS. USING THIS PRODUCT INDICATES YOUR ACCEPTANCE OF THESE TERMS AND CONDITIONS. IF YOU DO NOT ACCEPT OR AGREE WITH THEM, YOU SHOULD IMMEDIATELY RETURN THE ENTIRE PRODUCT AND RELATED DOCUMENTATION UNUSED WITH PROOF OF PURCHASE FOR A REFUND OF YOUR MONEY.

1. LICENSE. Control Data grants you a personal, nonexclusive license to use this Software Disk Product ("Product") and related documentation subject to this Agreement. A back-up copy of the Product may be included and is subject to the same terms and conditions.

2. COPYRIGHT. The Product and related documentation are copyrighted. You may not copy or otherwise reproduce any part of the Product or its related documentation, except that you may load the Product into your computer in order to use the Product and copy designated portions of the related documentation.

3. USE AND TRANSFER. This Product is for your personal use only.

   You may:

   a. Use the Product and related documentation only on a single computer at one time.

   b. Physically transfer the Product from one computer to another.

   c. Transfer this license and the Product (including the back-up copy, if any) and related documentation to another party if you transfer the entire Product, any back-up copy, and related documentation at the same time and if the other party agrees to be bound by this Agreement.

   You may *not*:

   d. Transfer the Product electronically from one computer to another over a network.

   e. Make and distribute copies of the Product and related documentation to others, except for designated portions of the related documentation.

   f. Sublicense, modify in any way, or prepare derivative works of the Product and related documentation.

   g. Use the Product and related documentation on more than a single computer at the same time.

   YOU MAY NOT USE, COPY, MODIFY, OR TRANSFER THE PRODUCT AND RELATED DOCUMENTATION, IN WHOLE OR IN PART, EXCEPT AS EXPRESSLY PROVIDED IN THIS AGREEMENT.

4. LIMITED WARRANTY, DISCLAIMERS.

   a. Control Data warrants the flexible disk on which the Product is contained to be free from defects in materials and workmanship for a period of 90 days from the date you acquired it. This warranty does not cover damage due to improper use or neglect.

      THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR CONTENT.

      Some states do not allow the exclusion of implied warranties, so the above exclusion may not apply to you. This limited warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

   b. Except as specified above, the Product and related documentation are furnished by Control Data on an "AS IS" basis and without warranty as to the performance or results you may obtain by using the Product and related documentation. The entire risk as to the results, performance, and cost of all necessary servicing, repair, or correction of the Product and related documentation is assumed by you.

5. REMEDY: REPLACEMENT OR REFUND. If, during the 90-day limited warranty period, a defect in the flexible disk occurs you may return the flexible disk to the place where you acquired it. If you acquired the flexible disk directly from Control Data, you may return it along with proof of purchase indicating the amount paid and date purchased to Control Data at the following address:

   Control Data Publishing Company, Inc.
   Customer Service
   P.O. Box 261127
   San Diego, CA 92126

   Control Data will replace the flexible disk without charge to you, or, at Control Data's option, refund the amount paid by you for the defective disk.

6. LIMITATION OF LIABILITY. NEITHER CONTROL DATA NOR ANYONE ELSE WHO HAS BEEN INVOLVED IN THE CREATION, PRODUCTION, OR DELIVERY OF THE PRODUCT AND RELATED DOCUMENTATION SHALL BE LIABLE FOR DAMAGES OF ANY KIND, INCLUDING SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, RESULTING FROM THE USE OF THE PRODUCT OR RELATED DOCUMENTATION OR ARISING OUT OF ANY BREACH OF ANY WARRANTY, EVEN IF THEY SHALL HAVE KNOWLEDGE OF THE POSSIBILITY OF SUCH POTENTIAL LOSS OR DAMAGE. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

7. TERM. This License is effective until terminated. You may terminate it at any time by destroying the Product and related documentation. It will also terminate if you fail to comply with any term or condition of this Agreement. You agree upon such termination to destroy the Product and related documentation.

8. YOUR USE OF THIS PRODUCT AND RELATED DOCUMENTATION ACKNOWLEDGES THAT YOU HAVE READ AND AGREE TO THE TERMS AND CONDITIONS OF THIS AGREEMENT. YOU FURTHER AGREE THAT THIS AGREEMENT IS THE COMPLETE AND EXCLUSIVE STATEMENT OF THE AGREEMENT BETWEEN US AND SUPERSEDES ANY PROPOSAL OR PRIOR AGREEMENT, ORAL OR WRITTEN, AND ANY OTHER COMMUNICATIONS BETWEEN US RELATING TO THE SUBJECT MATTER OF THIS AGREEMENT.

Control Data Publishing Company, Inc.
P.O. Box 261127
San Diego, California 92126

Printed in the United States of America AA8037 9-82

COMPUTER LITERACY

Introduction

PLATO®
EDUCATIONAL SOFTWARE

Copyright© 1979, 1982 by Control Data Corporation
All Rights Reserved

Printed in the United States of America

Adapted From:

INTRODUCTION TO COMPUTERS

by

Dr. John Aikin
Greg Starling

The Evergreen State College
Olympia, Washington

CREDITS

Additional materials developed by Control Data Corporation.

PLATO is a registered trademark of Control Data Corporation.

The Plato likeness is a trademark of Control Data Corporation.

All high resolution text and associated effects were generated using Higher Text II by Darrell and Ron Aldrich, copyrighted 1980, and available from Synergistic Software.

BASIC A^+ copyright© 1981, 1982 Optimized Systems Software, Inc.

Student materials may be copied and distributed by instructors for instructional purposes only.

Portions of this text were adapted by Control Data Corporation from the PLATO course "Introduction to Computers" by John Aikin and Greg Starling while at the Evergreen State College. Copyright ©1979 Control Data Corporation.

DISTRIBUTION INFORMATION

For additional information on this and other PLATO Educational Software, please write to:

Control Data Publishing Company, Inc.
P.O. Box 261127
San Diego, CA 92126

or

Call Toll Free:

800/233-3784.

In California, call:

800/233-3785

PREFACE

COMPUTER LITERACY: Introduction is a Control Data PLATO educational software package. It is available for use on APPLE II Plus®, ATARI 800®, and TEXAS INSTRUMENTS 99/4A® microcomputers.

Computer Literacy is designed to introduce computers to junior and senior high school students or to any interested individual. The lesson explores the evolution of computers, their applications, and their impact on people and society.

The package contains one or more flexible disks and a support manual. The disk(s) contain the computer activity and user instructions. The activity includes lesson text, illustrations, and interactive exercises. The manual contains an introduction to the Computer Literacy activity, the lesson flow, teaching and learning strategies, and supplementary materials.

APPLE II Plus is a trademark of Apple Computer, Inc.
ATARI 800 is a trademark of Atari, Incorporated.
TEXAS INSTRUMENTS 99/4A is a trademark of Texas Instruments, Incorporated.

CONTENTS

Page

I EQUIPMENT CONFIGURATION AND LOADING INSTRUCTIONS 1

II PUBLISHER'S NOTE 5

III ACTIVITY PACKAGE SUMMARY 7

IV INTRODUCTION TO COMPUTER LITERACY 9

V LESSON FLOW 11

VI TEACHING STRATEGIES 15

VII STUDENT MATERIALS 19
EVOLUTION OF COMPUTERS 21
QUIZ 31
GLOSSARY OF TERMS 35
ANNOTATED BIBLIOGRAPHY 79

VIII ANSWER KEY 83

INFORMATION ON ADDITIONAL PRODUCTS 85

DISK REPLACEMENT POLICY 89

I. EQUIPMENT CONFIGURATION AND LOADING INSTRUCTIONS

EQUIPMENT CONFIGURATION

In order to run a PLATO computer-based activity, one of the following microcomputer systems is necessary:

1. An APPLE II Plus with the following:
   a. TV or monitor
   b. 48K memory
   c. Disk drive and controller
   d. DOS 3.3 operating system
2. An ATARI 800 with the following:
   a. TV or monitor
   b. 48K memory
   c. Disk drive and controller
   d. DOS 2 operating system

3. A TEXAS INSTRUMENTS 99/4A with the following:
   a. TV or monitor
   b. 32K memory expansion
   c. Disk drive and controller
   d. PLATO Interpreter Cartridge*

LOADING THE MICROCOMPUTER

The Computer Literacy activity is contained on a flexible disk that must be inserted into the disk drive. Figure 1 below shows a disk and a disk drive.

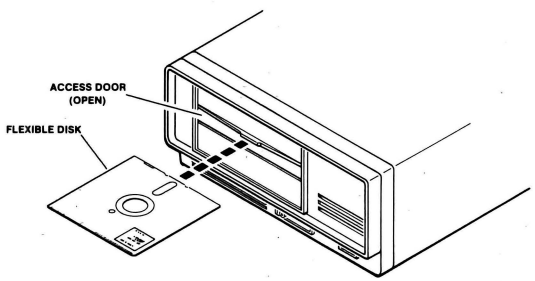

Figure 1. Disk and Disk Drive

To load the Computer Literacy activity into the computer, follow the instructions for your microcomputer.

*See the distribution information.

APPLE II PLUS

1. Make sure the APPLE II Plus is off.
2. Insert the disk into the disk drive (see figure 1) and close the door of the disk drive.
3. Turn on the APPLE II Plus microcomputer.
4. The title page for Computer Literacy will appear on the screen.

ATARI 800

1. If the BASIC Computing Language (left cartridge) has not been removed, you must remove it.
2. Make sure that both the ATARI 800 computer and the ATARI 810 Disk Drive are turned off.
3. Turn on the ATARI 810 Disk Drive and wait for the busy light to go out.
4. Insert the disk into the disk drive (see figure 1) and close the door of the disk drive.
5. Now, turn on the ATARI 800 computer.
6. The title page for Computer Literacy will appear on the screen.

TEXAS INSTRUMENTS 99/4A

1. Connect the pieces according to the manufacturer's instructions and plug everything into the AC.
2. Turn on the switches in the following order:
   a. Disk drive
   b. Disk controller
   c. RAM expansion
   d. CPU
   e. Monitor or TV
3. Insert the PLATO Interpreter Cartridge into the CPU. The Texas Instruments standard display will appear on the screen.
4. Press any key.
5. Follow the prompts that appear on the screen to insert the disk and start the lesson.
6. The title page for Computer Literacy will appear on the screen.

II. PUBLISHER'S NOTE

Control Data Publishing Company, Inc. offers the opportunity to supplement introductory computer education curricula with a Computer Literacy activity package. This package is designed to provide the student with some basic information about computers and in doing so increase the student's awareness of the role of computers in science, industry, and society.

It is important that students feel comfortable with computers as their use becomes more and more common and varied. At present, student use of computers in the classroom ranges from using the computer as a tutoring or recreational device to actually writing and applying programs.

The PLATO Computer Literacy package can be used as a curriculum component in any course where students need to learn about computers. The lessons are applicable for students from upper elementary grades through post-secondary levels who are learning about computers. The Computer Literacy package can be used as a basis from which to build a student's knowledge of computers.

Control Data is working toward additional software packages to supplement and support this and other academic subjects.

III. ACTIVITY PACKAGE SUMMARY

Description: **COMPUTER LITERACY: Introduction** is a PLATO educational software package. It contains the Computer Literacy computer-based activity and a support manual.

Objective: The Computer Literacy activity is intended to introduce computers to the student. The activity provides information on the history and uses of computers and on some issues facing a computerized society.

Activity: The Computer Literacy activity contains six lesson sections. These sections include instructional text, animated examples, and interactive activities designed to increase a student's understanding of computers.

Manual: The support manual supplements the computer-based activity with the following material:

Lesson flow	The Lesson Flow section of this manual describes the sections included in the activity. It covers the objectives of each section along with the features and options available.
Strategies	The computer-based Computer Literacy activity is primarily an individualized learning tool, but the concepts it covers may be integrated into group activities. The Teaching Strategies section of this manual suggests some ways that the Computer Literacy activity may be used as a basis for additional activities.
Student materials	The Student Materials section of this manual contains a glossary of computer terms and other supplementary material.

IV. INTRODUCTION TO COMPUTER LITERACY

COMPUTER LITERACY: Introduction is designed to be an educationally sound learning tool. Using text, animated graphics, and interactive activities, it is intended to fulfill the following objectives in introducing computers to students:

- To familiarize students with some of the ways computers are being used.
- To present examples illustrating general principles about the ways computers can and cannot be used.
- To develop an understanding of the nature of computers and the nature of programs and programming.
- To clarify that the computer is an evolutionary outgrowth of earlier tools and inventions and to show that the computer, like all technological advances, creates new needs even as it satisfies those that led to its development.
- To show the complexity of the effects of technological changes on society and to encourage the student to analyze the social impact of the use of computers on individuals.

- To clarify the differences between people and computers by emphasizing that techological factors determine a computer's capabilities but human factors determine the ultimate use of those capabilities.
- To acquaint students with some common terminology associated with computers.

The Computer Literacy activity contains six sections that together are designed to meet each of the above objectives. The six sections cover the following topics and each can be accessed independently from an index.

- Activity objectives and orientation.
- Overview of computer parts and computer applications examples.
- Ways that computers can and cannot be used.
- The nature of computers and computer programming.
- The evolution of tools and technology.
- Social impact of new technology.

V. LESSON FLOW

LESSON

When the Computer Literacy activity begins, the student is first introduced to the lesson. The brief orientation explains the major subjects covered, the lesson objectives, and the specific instructions on how to use the keyboard functions. After the introduction, the computer presents an index that lists the six major sections of the lesson. The student may then choose to see any one of the six sections.

1. Review Instructions

This section contains the orientation material and instructions. It is presented at the beginning of the lesson. The student may choose to review this section before going on to one of the other sections.

2. Examples of Computer Uses

Using text and an interactive question and answer format, this section first describes the four major components of a computer: the central processing unit (CPU), memory, input devices, and output

devices. Next, the lesson presents animated examples of how computers may be used. The examples include business, financial, scientific, word processing, and manufacturing applications. These examples are followed by a short interactive dialogue on computer applications.

3. Limitations of Computers

The third section contains an exercise in which the student can apply what was learned about computer applications in the second section. The lesson presents an idea for using a computer and the student must decide if the idea is practical. The lesson responds with feedback designed to address the student's decisions.

4. The Nature of Computers

The fourth section addresses the nature of computers and computer programming. The student plays a game called Splat where the goal is to move a playing piece across a board without falling into a pit. The player can test to see if a pit is hidden in front of the playing piece before actually making the move.

The game illustrates a basic principle of computer programming IF, THEN, ELSE statements. For example, to win the Splat game, a student must follow these steps.

1. Test to see if there is a pit ahead.
2. IF there is no pit,
3. THEN move forward,
4. ELSE turn to test another route.
5. Repeat until the far side of the board is reached.

These steps show how a computer processes instructions in a step by step fashion. In addition, the game also reinforces the idea that computers are capable of doing only what people tell them to do. People are responsible for how computers are used.

5. Where Computers Came From

Using text and animation, this section explains that the computer is an evolutionary machine with roots in earlier inventions. Illustrations are given of how tools are invented to solve human problems. The ways in which the invention of tools alters society are also explored.

6. How Computers Affect Us

The last section explores the impact of computers on people. It notes that technological upheaval is not unique to our time. It explains that the ways in which a person is affected by new technology may depend on that person's role in society. Examples of

computer uses are presented. The student can evaluate these uses in terms of who benefits and how. Thus, this section presents the student with a perspective from which to analyze the impact of computers on society as a whole.

The Computer Activity

It is suggested that the student proceed through the sections in the Computer Literacy lesson in the given order. Each section builds on information presented in previous sections.

The computer provides constructive feedback in the interactive sections. The animated graphics provide entertaining visual stimulation. The text is light and informative. Together, these lesson components should familiarize the student with computers in general and provide a basis from which to continue learning more about computers.

In addition, the fact that this activity is presented by a computer should help to alleviate any existing computer anxiety. The activity is designed to provide the student with a positive experience as a computer user.

VI. TEACHING STRATEGIES

The Computer Literacy activity is self-contained and does not assume any prior experience with computers. It is designed as a general introduction to computers and as such provides a basis for other learning activities. It can be used alone as an individual learning activity, or it can be used to support material taught in the classroom. This section suggests several activities that may be used to deepen students' understanding of the concepts presented in the Computer Literacy activity.

INDIVIDUAL ACTIVITIES

The following activities are suggestions that can be assigned or pursued on an individual basis.

1. Research Projects - Library research, direct observation, and interviews are sources from which a student can find material on a particular computer or a specific computer application.
2. Scenarios - Science fiction resources or individual imaginary situations could be used as a basis for reports on the social impact of computers.

GROUP ACTIVITIES

The following activities are suggestions for integrating the concepts of Computer Literacy into large group or classroom activities.

1. Group Discussions - Group discussions could be initiated on the following topics:

   a. What kinds of tasks are logical for computers to do? What kinds of tasks are not reasonable for computers to do?

   b. Have students think of tasks that are performed by specific steps. Some suggestions are making a telephone call, traveling from one point to another, or unlocking a door and entering a house. Collectively construct a complete set of instructions for these tasks. Have the students act out the instructions.

   c. As a counterpoint to technological advancement, have students discuss things that have not changed in thousands of years and what characterizes these things.

   d. Describe a day without computers.

2. Field Trips - Group field trips provide opportunities to see computers in action. The possibilities include newspapers with word processing systems, banks, automated factories, scientific laboratories, travel offices, and government record-keeping offices.

3. Group Games - The Splat game could be adapted to a life-size board where some students give instructions to other students to move around the board. The game could be altered so that one student directs another to perform a task. The student giving instructions can make no assumptions and the student performing the task can only follow exact instructions.

In addition, the materials in the Student Materials section of this manual may be used to generate other individual and group activities.

VII. STUDENT MATERIALS

This section contains a brief history of computer development with a short follow-up quiz, a glossary of computer terminology, and an annotated bibliography which can be used to help design follow-up activities or to provide a resource for gaining more extensive knowledge of computers.

The material in this section may be copied and distributed for instructional purposes.

EVOLUTION OF COMPUTERS

EARLY COMPUTERS

The oldest known manual computing device was the abacus. Thousands of years ago it was used extensively by early civilizations in Greece, Rome, and China.

In the early 17th century, William Oughtred developed a crude predecessor to the modern slide rule which is a linear computer. A slide rule uses a logarithmic scale to do calculations.

The following people and their inventions made significant contributions to the evolution of computers:

- **Pascal**

  The first mechanical adding machine was invented by the Frenchman Blaise Pascal in 1642. His device used a series of gears, toothed wheels, and a carry lever.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

- **Leibnitz**

  In 1672, Gottfried Leibnitz built a calculating machine similar to Pascal's that could also subtract, multiply, and divide.

- **Jacquard**

  In 1804, a French weaver, Joseph Jacquard, invented an automatic loom that used punched cards to control the weaving pattern.

- **Babbage**

  A man ahead of his time, Charles Babbage, an Englishman, was the father of the digital computer. By the 1820s, he had conceived and outlined plans for a mechanical computer complete with a central processor, memory, and punched card data entry. He called his computer an analytical engine.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

Unfortunately, the technology of his time was far behind his ideas, and he was never able to attain parts that were sufficiently reliable to make his "engine" practical.

- **Hollerith**

  Because of primitive tabulation techniques, the United States census of 1880 was not completed until 1888! The U.S. Census Bureau contracted with Herman Hollerith to provide a faster, more efficient system for the census of 1890.

  Hollerith developed a punch card system similar to Jacquard's. His card-sorting machine enabled the census of 1890 to be completed in less than three years.

  Later, Hollerith formed the Tabulating Machine Company, the predecessor of International Business Machines Corporation (IBM).

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

- **Aiken and the Mark I**

  In 1937, Howard Aiken of Harvard University designed the first electromechanical digital computer, and by 1944, the Automatic Sequence Control Calculator MARK I was completed by IBM at Harvard. A clattering giant, MARK I had hundreds of thousands of relays and filled a room the size of a gymnasium.

- **Mauchly, Eckert, and ENIAC**

  By replacing the relays with electronic tubes, another team built ENIAC (Electrical Numerical Integrator and Computer), the first truly electronic computer. Designed by John Mauchly and J. Presper Eckert as a secret project during World War II, ENIAC was completed in 1945. Designed specifically for ballistics calculations, ENIAC was a thousand times faster than MARK I. Though not as big as MARK I, ENIAC was huge, weighing 30 tons! It needed enormous amounts of power too.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

TECHNICAL MILESTONES

Hardware

Hardware is the term used to describe the physical components of computers (wires, switches, circuits, boxes, disks, drums, etc.).

- **Vacuum Tubes**

  The first electronic computers used vacuum tubes. ENIAC had 18,000 of them! Tubes burned out frequently, but the rate of computation reached several thousand operations per second.

- **Transistors**

  In the late 1950s the transistor began replacing tubes. The transistor increased reliability, reduced size, and lowered costs. Within ten years, though, another technological breakthrough brought a new generation of computers.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

- **Integrated Circuits**

  In 1964, IBM introduced its System/360, which used microelectronic integrated circuits. Along with greatly reduced cost, the integrated circuit increased the computing speed to one million operations per second!

Software

Software is the term used to define the programs and the data storage structures that computers use.

Basically, computer instructions are a series of numbers. For example, the number 63470 may mean add X to Y and store the sum in location Z.

That system of numbers is called a language. Since it is at a basic, machine level it is called a low-level language or machine language.

Programming and reading low-level languages are slow and cumbersome. Several high-level languages have been written that are easier for people to work

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

with. These languages are translated or interpreted into machine language so they can be understood and executed by the computer.

Among the high-level languages written since 1950 are:

- 1956 - FORTRAN (FORmula TRANslator)
- 1958 - ALGOL (ALGOrithmic Language)
- 1960 - COBOL (COmmon Business Oriented Language)
- 1965 - BASIC (Beginner's All-purpose Symbolic Instruction Code)
- 1971 - Pascal (An all purpose language named for Blaise Pascal)

As you can see from their names, many high-level languages were written for specific applications.

In early computers, the set of instructions or program was either fed in by paper tape or by rewiring a control panel.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

In 1946, John von Neumann, in collaboration with Goldstine and Burks, suggested the concept of a stored program.

They suggested that not only should data be stored in the computer's memory, but also the set of instructions (the program). Using the stored program concept, processing speed and flexibility were greatly enhanced.

CURRENT TRENDS

Miniaturization

Hardware continues to get smaller and less costly. Components such as microprocessors and bubble memory are literally being manufactured microscopically.

Software Development

While hardware costs are decreasing, the cost of producing software is increasing. Though many simpler applications are being serviced by modular

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

software packages, the more complicated areas, such as payroll accounting and simulations, often still require the services of skilled programmers.

Microcomputers

Hardware costs have fallen to a level where more and more organizations and even individuals are able to invest in a computer. The rapid growth of microcomputers in the computer market has led to their use in business, education and recreation in an ever-increasing number of applications.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

EVOLUTION OF COMPUTERS

Quiz

Name: _____ Date: _____ Hour: _____

Directions: Circle the best answer to each of the following questions.

1. The oldest known computing device is the:
   a. analytical engine
   b. abacus
   c. slide rule
   d. pyramid square
2. The first mechanical computer, using gears and toothed wheels was invented in 1642 by:
   a. Blaise Pascal
   b. Herman Hollerith
   c. Alice McGixney
   d. John von Neumann

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

3. The father of the digital computer was:
   a. Gottfried Leibnitz
   b. Herman Hollerith
   c. John von Neumann
   d. Charles Babbage
4. Who developed the punched card system used in the 1890 census?
   a. William Oughtred
   b. Herman Hollerith
   c. Blaise Pascal
   d. Charles Babbage
5. The first electronic computers, MARK I and ENIAC, were developed primarily for:
   a. biological testing at Harvard
   b. weapons testing
   c. weather forecasting
   d. the United States Census

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

6. Which item is not an example of hardware?
   a. high-level language
   b. vacuum tube
   c. integrated circuit
   d. I/O device
7. Which electronic component forms the basis for modern computers?
   a. integrated circuit
   b. vacuum tube
   c. transistor
   d. analytical engine
8. Which of these is a high-level computer language:
   a. BALTO
   b. CLAN3
   c. GFARG
   d. BASIC

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

9. The fastest growing market in the computer field is:

   a. large computers

   b. microcomputers

   c. integrated circuits

   d. minicomputers

10. Hardware costs are:

   a. dropping while software development costs increase.

   b. increasing at the same rate as software costs.

   c. increasing while software costs decrease.

   d. staying at about the same level.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

GLOSSARY OF TERMS

— A —

acoustic coupler

An acoustic coupler is a device that allows a computer to send and receive data over a telephone line using a standard telephone.

address

An address in the context of computers refers to a memory location. Each piece of information in memory can be found through its address, which is like a mailbox number.

ALGOL

ALGOL (ALGOrithmic Language) is a high-level language used widely in Europe, mostly for scientific computations. It is similar in purpose to FORTRAN.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

algorithm

An algorithm is a sequence of steps that collectively define a procedure for achieving some result, such as computing the square root of a number.

analog

An analog quantity is one that can vary continuously in value. For example, the pitch and loudness of a sound are analog quantities, since they may take on any value. This is in contrast to digital.

analytical engine

The analytical engine was a mechanical predecessor of the modern computer. Designed by Charles Babbage, it was beyond the technology of the 19th century and never built.

APL

APL is A Programming Language that is especially useful for mathematical computations involving vectors, matrices, and functions.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

application

An application is any ultimate use of a computer, for example: processing payroll, controlling a machine tool, giving instruction, or computing statistics.

artificial intelligence

Artificial intelligence is a branch of computer science concerned with trying to develop intelligent machines; that is, "thinking" computers.

ASCII

ASCII is the American Standard Code for Information Interchange, which was developed as a standard way of logically coding characters.

assembly language

An assembly language is the simplest form of symbolic computer language. Mnemonic symbols are used to represent the numbers of machine language to simplify programming.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

— B —

Babbage

Charles Babbage (1792-1871) was a British mathematician whose analytical engine laid the theoretical foundation for modern computers. He was a man ahead of his time.

ballistics calculations

Ballistics calculations determine the angle at which a gun should be aimed, given a certain range, wind, etc. This was one of the first uses of computers.

base

All number systems use a base that specifies how many different symbols are used to code numbers. The base commonly used is the decimal system, base 10. It uses symbols 0 through 9. Computer programs use bases 2, 8, and 16.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

Base 2

Base 2 is a number system with only two symbols: 0 and 1. Computers do arithmetic in base 2 (binary) because it is easy to build electric circuits with just two states (on or off).

BASIC

BASIC (Beginner's All-purpose Symbolic Instruction Code) is a high-level programming language that is easy to learn and suitable for many business, scientific, and other computer programs.

batch processing

Batch processing is a way of running a computer in which programs and their required data are loaded sequentially into the machine and run without further
user interaction.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

BAUD

The BAUD rate is a measure of the speed at which data may be sent over a communications circuit such as a phone line. Characters per second are approximately BAUD/10.

binary number

A binary number is a number coded in base two. Binary numbers consist only of zeros and ones and are used inside computers. 1983 is 011110111111 in binary.

bit

A bit is the smallest unit of computer information and consists of a single choice between two alternatives. Thus, a person's sex can be coded in one bit.

bomb

When a program causes the computer to halt unexpectedly, it is said to have bombed, crashed, or died.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

Boolean algebra

Boolean algebra (named for George Boole) is a binary system of algebra used for the analysis of systems based on formal logic. It is a key tool in logical analysis.

bug

Bugs and glitches are errors in computer programs. Such errors, which are made by the programmer, cause programs to fail to do what was intended.

byte

A byte is a sequence of binary digits usually operated on as a unit. A byte is often 8 bits in length (but 6, 12, and 16 are also used).

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

— C —

calculator

A calculator is sometimes difficult to differentiate from a computer. Generally, a calculator lacks the branching capabilities of a computer but can do similar arithmetic operations.

CBE

CBE is Computer-Based Education, and is used to refer to the use of computers in education generally. CBE is also called CAI (Computer-Aided Instruction) and CMI (Computer-Managed Instruction).

COBOL

COBOL (COmmon Business Oriented Language) is the most widely used business programming language on large computers. It is rather difficult for computer novices to learn and requires a larger computer than BASIC.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

compile

To compile is to translate a high-level computer language into machine language before the program is run. This is done by programs called compilers.

compiler

A compiler is a special computer program that can prepare a program written in a high-level language for execution on a computer by translating it into machine language.

computer

Computer usually refers to a digital computer, which is a machine that can manipulate symbols and perform arithmetic at high speed.

computer-aided instruction

CAI is Computer-Aided Instruction, which is the use of a computer as a teacher or tutor. The lessons you study on the computer are examples of CAI.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

core

Core is an archaic (1960s) term for main memory or storage. It derives from the fact that memory was once constructed from tiny magnetic donuts.

CPU

The CPU, Central Processing Unit, is the part of a computer that performs the actual processing of information.

CRT

A CRT, Cathode Ray Tube, is a terminal that uses a TV-type display as an output device. CRTs are also called screens or monitors.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

— D —

data

Data is information. Data can be numbers, words, pictures, and so on. In short, data can be any one piece of information about any subject.

database

A database is an interrelated set of files that form a complete (for the intended purpose) set of information. For a business, the database would be all its records.

data processing

Data processing (DP) is the common name for either the group within an organization that manages/operates/programs computers or for the act of processing data by computers.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

debug

To debug a program is to go through the process of finding and then eliminating errors (bugs). The need for debugging may be reduced through structured programming.

decimal

A decimal number is one coded in base 10. While decimal numbers are popular because we have 10 fingers, computers require base 2 (binary) because they use electrical circuits that can be switched on (1) or off (0).

digital

Digital refers to a condition where an object, system, or quantity can only be defined by precise states of existence. This is in contrast to analog which is continuous in nature. For example, your TV is digital because it is either ON or OFF. No continuum exists between these two states.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

digital data

Digital data is information that is represented by some finite number of digits. In a computer, these digits are coded as a pattern of 0s and 1s in a series of bits.

disk

Disk is a generic term for a kind of mass storage in which data is stored on a rapidly rotating metal platter in the form of variations in magnetic fields.

display

As a noun, a display is a collection of text and/or graphics that you see when you use a computer terminal that has a video screen. To display is to present such a collection.

documentation

Documentation is the process of keeping an adequate record of what a program does and exactly how the statements in that program accomplish the task.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

dot matrix

A dot matrix display represents characters (letters, numbers, figures) as a pattern of dots.

drive

Drive is a generic term for the physical device on which a tape or disk is mounted for use, as in "Load the payroll tape on the drive, please."

— E —

electronic brain

Electronic brain is a misnomer for computer. Current computers have little in common with our brains and do not have adequate intelligence to warrant such a label.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

electronic funds transfer

Electronic Funds Transfer (EFT) is the process of conducting financial transactions among banks, businesses, and people by passing data electronically among computers.

encryption

Encryption is the process of translating data into a secret code so that it may be protected from unauthorized use.

ENIAC

ENIAC (Electronic Numerical Integrator And Calculator) was the first electronic computer. It was developed at the University of Pennsylvania in the 1940s.

error

Errors are discrepancies between actual computer results and the correct or expected results. Errors arise in many ways, including faulty programming and equipment failure.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

execute

In computer jargon, to execute a program is to have the computer carry out the task described by the program. Run is another term for execute.

— F —

fatal error

A fatal error is an error during the execution of a program that is so serious that execution of the program cannot continue.

file

A file is a collection of data records stored on external memory (such as tape or disk). Computer files serve the same purpose as manual files and are similarly organized.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

floppy disk

A floppy disk is a semirigid circle of magnetic material used to store data such as a program or a lesson.

FORTRAN

FORTRAN (FORmula TRANslator) is a high-level computer language most often used for scientific computations. It is one of the oldest high-level languages and is similar to BASIC.

— G —

garbage

Garbage is data in memory that is meaningless; it is usually left over from an earlier program. The term is also applied to useless output. See GIGO.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

GIGO

GIGO stands for Garbage In, Garbage Out, which expresses the fact that the input must be correct if the output is to be correct.

graphic device

A graphic device is a computer peripheral that accepts input or produces output involving drawings or other visual data.

— H —

hardcopy device

A hardcopy device is a printing device that can be attached to a computer. Such printers can produce a paper copy of a program or a screen display, depending on the features of the printer.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

hardware

Hardware refers to computer machinery itself, to the physical devices. This is in contrast to software, which refers to the programs that use the hardware.

hexadecimal

Hexadecimal numbers are coded in base 16. Base 16 uses the letters A through F in addition to 0 through 9 to code numbers. 1983 in decimal numbers is 7BF in hexadecimal.

high-level language

A high-level language is a computer language that allows a programmer to be less detailed in writing a computer program. BASIC is an example of such a language.

Hollerith

Dr. Herman Hollerith developed a system for using punch cards to tabulate the 1890 census data. His method of coding data as punched holes in cards is still used today.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

— I —

illegal

A command or program statement is illegal if it violates the rules of the system. See also syntax error.

impact printer

An impact printer produces printed output using a process similar to that used by a conventional typewriter: raised letters strike an inked ribbon leaving imprints on paper.

information processing

Information processing is the analysis of data (either manually or using computers) to extract meaningful information.

input

Input is information given to the computer for processing. Whenever you type something on a keyboard, you are providing input to the computer.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

instruction

An instruction is a command to the computer to perform some action. Computer programs are made up of sequences of instructions that do simple tasks like adding numbers.

integer

An integer is a whole number such as 1 or 237, as contrasted with a number having a decimal point, such as 23.67 or 1.0003, or a fraction such as 1/3.

integrated circuit

An integrated circuit (IC) is a tiny collection of electronic components in a single package to perform a specific function. Integrated circuits form the basis of the modern computer.

interactive

In interactive computing, a human being interacts with the computer, entering and receiving information from an executing program.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

interface

An interface is a generic term for a point where two programs, modules, computers, peripherals, or even people interact. Well-defined interfaces promote communication.

I/O

I/O is an abbreviation for input/output. It is most often used in the context of describing devices (I/O device) or computer operations (I/O operation).

I/O device

An I/O device is a machine that is used to communicate information to and/or from a computer.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

— J —

Jacquard loom

A Jacquard loom is a machine for weaving cloth that was invented by Joseph Jacquard in the early 1800s. The loom used holes punched in cards to control the pattern being woven.

joystick

A joystick is a graphic input device. It consists of a vertical lever that can be moved left/right and front/back, much as the stick of an airplane. The position of the joystick determines the location of the input.

— K —

keyboard

A keyboard (or keyset) is a collection of keys that can be used to type information into a computer. The computer you are using has a keyboard.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

— L —

language

A computer language is a set of instructions and rules for using them (syntax). The language can be used to prepare a computer program.

legal

A legal computer statement or command is one which is syntactically correct. That is, it conforms to the rules of the computer system, although it may still be inaccurate for producing the desired effect.

Leibnitz

Gottfried Leibnitz (1646-1716) was an Austrian mathematician who developed a mechanical calculator capable of arithmetic. He also invented the binary number system.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

light pen

A light pen is a device that allows the user of a CRT to point (with the pen) to a place on the display screen and have the indicated location communicated to a computer.

line printer

A line printer is a peripheral that prints an entire line of output (often 120 characters) at once. Line printers can print at speeds up to 2000 lines per minute.

LISP

LISP is a LISt Processing language that is designed for working with data that can be structured in lists. It is widely used in artificial intelligence.

logic error

A logic error occurs when a program does not do what the programmer intended, even though all of the statements in the program are legal. See also syntax error.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

loop

A loop is a sequence of instructions that is repeated until some condition is obtained. Loops are frequently used to program a repetitive task, such as writing paychecks.

low level language

Machine language and assembly language are called low level languages, because they require the programmer to explain tasks to the computer in great detail.

— M —

machine language

Machine language is the most basic kind of computer language. Every kind of computer has a unique machine language that codes instructions as numbers.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

magnetic tape

Magnetic tape is used to store data for long periods of time between uses by computers and to transfer data among computers. Tape is used on a tape drive.

mainframe

Mainframe is a synonym for any computer larger than a microcomputer. It is sometimes used as a term for CPU.

MARK I

The MARK I was the first modern computer. Developed at Harvard University by H. H. Aiken's group in 1944, it was based on electromechanical relays and held 100 numbers.

mass storage

Mass storage generally refers to any large external memory system, such as disk or tape, that is used to hold files. Some mass storage systems hold trillions of characters.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

megabyte

A megabyte is one million bytes or characters. The term is usually used to refer to the amount of either memory or mass storage. It is abbreviated MBYTE.

memory

Memory is the part of the computer used to hold data while it is being processed by the computer. The memory stores all its information coded as numbers.

microcomputer

A microcomputer is a computer that uses a microprocessor chip as its central processing unit.

microelectronics

Microelectronics is the use of extremely tiny electronic devices in circuits. Digital watches, pocket calculators, and most computers are examples of devices that use microelectronics.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

microprocessor

A microprocessor is a complete CPU in a single tiny electronic chip. Microprocessors are being widely used in many things, from microcomputers to automobiles.

minicomputer

A minicomputer is a computer that is bigger than a microcomputer but smaller than a maxicomputer. Minis are widely used in science and business today.

MODEM

A MODEM (from MOdulator/DEModulator) is a data communications device that allows digital computers to send and receive data over telephone lines.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

— N —

network

A computer network is a collection of computers and peripherals connected through a communications system so that data and processing may be shared among the machines.

noise

Noise is random variation in some quantity. For example, telephone lines and radios pick up noise (or static) that can interfere with communication of data.

number crunching

Number crunching is the carrying out of a long calculation which usually has many steps and requires a great deal of computer time. Many engineering problems are examples.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

— O —

octal

Octal numbers are coded in base 8 and are a convenient way of representing binary numbers. 1983 in decimal numbers is 3677 coded in octal numbers.

off-line storage

Off-line storage is external storage (for example, cards or tape) that requires human intervention before it can be used by a computer. Contrast this with on-line storage.

on-line storage

On-line storage is a form of external storage accessible to a computer without human intervention; in contrast to off-line storage.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

operating system

An operating system (also called a system control program, or executive) is a program that controls and coordinates various uses of the computer.

output

Output is information that the computer has finished processing. It is provided to you as the result of a computation.

output device

An output device is a machine used to transmit information from the computer to a person or another computer. Screen displays and printers are common ways to output information.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

— P —

paperless transaction

A paperless transaction is one recorded entirely in a computer and for which no permanent paper record is made.

parity

In the context of computers, parity refers to the use of an extra bit in data representation to provide redundancy that can be used to detect errors in data transmission.

Pascal

1. Blaise Pascal (1623-1662) was a French mathematician who built one of the first mechanical calculators.
2. Pascal is a recently developed high-level programming language that many people believe will become widely used on microcomputer systems.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

peripheral

Any device attached to a computer, therefore, any piece of hardware other than the memory or central processing unit.

printer

A printer is an output device that produces computer output on paper in a form you can read. Printers are used to print bills, statements, licenses, and so on.

printout

A printout is any printed result of running a computer program.

process

Computers process data; that is, they transform input data into some sort of output just as a cannery processes raw beans (input) into canned french cut beans (output).

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

programmer

A programmer is a person who prepares programs for computers. Professional programmers are subdivided into systems programmers and applications programmers.

programming

Programming is the process of preparing a program for a computer. It is the preparation of an ordered set of detailed instructions describing some task for the machine.

— R —

random access memory

Random Access Memory (RAM) is a type of memory that allows the content of any address to be written/read without accessing any other address. RAM is usually the main memory of a computer.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

read

To read data is to copy data from some external medium, such as cards, tape, or disk, into a computer's memory.

real time

In real time computing, the program must produce output before the actual process is over. Thus, a real time weather forecasting program must be done before the storm is over.

robot

A robot is a computer that is capable of either movement or some other physical activity affecting its environment. It operates under the control of a program within the machine.

ROM

ROM stands for Read Only Memory, which usually is a kind of high-speed memory that can be read but not altered. ROM is good for frequently accessed data.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

— S —

semiconductors

Semiconductors are chemical elements (such as silicon, germanium, gallium, and so on), that have special properties. They are the basis of modern solid state electronics.

sensor

A sensor is any device that a computer can use to gather data about its surrounding environment. Such sensors are analogous to our eyes or ears.

silicon

Silicon is a chemical element that is used to make many modern electronic devices used in computers. Silicon components are members of the generic group semiconductors.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

Silicon Valley

The Silicon Valley (sometimes referred to as Silicon Gulch) is an area on the San Francisco Peninsula so called because of the large number of electronics companies located there.

software

Software refers to computer programs in contrast to the computer machinery (hardware) used to run the programs. Hardware and software work together to do computations.

spectrophotometer

A spectrophotometer is a scientific instrument used to measure the wavelength composition of light. It is an example of a device that can be used with a computer.

statement

A statement is a sentence in a programming language that describes some action the computer is to take. An example might be "Let x=2+3" in BASIC.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

storage

Storage generally is synonymous with memory in its various forms (working memory/storage, external memory/storage, and so on).

storage device

A storage device is a peripheral that is used to store data outside of the computer's main memory. Magnetic disks and tape drives are examples of such devices.

syntax

The syntax of languages (including computer languages) is concerned with the rules governing the structure of valid statements using grammar rather than meaning.

syntax error

A syntax error occurs when a programmer enters a command or statement that violates the syntax (rules) of the system being used. See also logic error.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

system

A system is any set of objects, components, etc. that works together to achieve some function. System also refers to a computer or software package.

systems analyst

A system analyst is a person who is experienced in using computers, works with people to help them define their needs for information systems, and designs systems.

— T —

tape drive

A tape drive is an I/O device that is used to read data into a computer from magnetic tape and/or write data from a computer onto tape. Drives may use reels or cassettes.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

terminal

A computer terminal is an input/output device that includes a way to input data to a computer (such as a keyboard) and a way to display output (such as a screen).

timesharing

Timesharing is a way of using a computer in which more than one person can use the computer interactively at the same time. Thus, many people share time on the computer.

transaction

A transaction is an interaction with a computer consisting of input, processing, and output, all related to a single operation, such as making an airline reservation.

transistor

A transistor is an electronic component that can amplify a signal or act as a switch. Transistors are widely used in computers. See also integrated circuits.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

— U —

user

A user is a person who uses a computer system or program that he or she did not write. You are a user of the disk in this instructional package.

utility

A utility is a program or subroutine of general value to a variety of users and/or for a variety of purposes. Utilities, for example, may do common file handling or I/O tasks.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

— V —

vacuum tube

A vacuum tube is an electronic component that was widely used in electronic equipment such as radios, TVs, and computers prior to the invention of transistors.

video

Video refers to a picture display. For example, a video terminal is a computer terminal that displays its output on a screen similar to a TV set.

voice synthesizer

A voice synthesizer is an output device that produces speech when given an alphabet-like code of what is to be spoken.

von Neumann

John von Neumann made important contributions in the 1940s and 1950s to computer development by advocating use of binary numbers and by inventing the stored program.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

— W —

word processing

Word processing is an application where computers are used to generate and edit text for letters, documents, or other written material.

write

To write data is to transfer it from a computer's memory to some external device such as a tape, disk, or cards. This process destroys any data previously existing in that space in memory.

Permission is granted to instructors to copy and distribute this worksheet for instructional purposes only.

Copyright© 1979 by Control Data Corporation
All Rights Reserved
Printed in the United States of America

ANNOTATED BIBLIOGRAPHY

Dawley, Alan:

Class and Community: The Industrial Revolution in Lynn; Harvard University Press; Cambridge, Mass; 1976.

This book analyzes the impact of the introduction of shoe-making machinery into the community of cobblers existing in Lynn, Massachusetts, at the beginning of the 19th century. It is a valuable example of the complexity of technology's effects on people's lives. It also makes use of computers as an analytic tool, and hence is of interest for this reason as well.

Pattis, Richard E.:

Karel the Robot: A Gentle Introduction to the Art of Programming; John Wiley and Sons; New York; 1981.

This book is about programming. It uses a simple robot (Karel) as a vehicle for introducing the ideas of structured programming. The book is probably

too difficult for all but high school seniors and beyond. Teachers who are familiar with programming, however, will find it a rich source of ideas for explaining the nature of computers and of programming.

"Scientific American"; September, 1982:

"The Mechanization of Work"; Vol 247, #3.

The entire September issue of this familiar science magazine is devoted to an examination of the ongoing effects of the industrial revolution, including the impact of computers. This issue would be an excellent source for both teachers and for student readings on the issues raised by automation.

Weizenbaum, Joseph:

Computer Power and Human Reason: From Judgement to Calculation; W. H. Freeman and Co.; San Francisco; 1976.

This is the definitive work on the ethical and social issues raised by technology in general and by the use of computers in particular. It also contains a clear explanation of the nature of computers and of the nature of programming. It is somewhat sophisticated for precollege students, but teachers will find it a wonderful source of ideas which can be translated to precollege settings. There is no better source on the question of computers and values.

VIII. ANSWER KEY

Evolution of Computers Quiz

1. b
2. a
3. d
4. b
5. b
6. a
7. a
8. d
9. b
10. a

INFORMATION ON ADDITIONAL PRODUCTS

BASIC NUMBER FACTS

Practice in basic numbers including addition without carrying, subtraction without borrowing, and multiplication/division with single digits. A "Speedway" format allows children to "race" against time to build up their speed in these math areas. Designed for elementary students or any student requiring practice with basic whole number operations.

WHOLE NUMBERS

Practice in whole number operations. Interest is developed by use of a simulated pinball game to build skills in addition, subtraction, multiplication, division, and mixed numbers. Designed for elementary and junior high math students.

FRACTIONS

Practice locating fractions on a number line. Students are challenged to "burst" balloons by "throwing" darts at the correct location on the number line. Balloons may be burst in any order, on

a trial-and-error basis, until none are left. The exercise may be carried out with or without negative numbers. The difficulty adjusts to the student's performance. Designed for elementary math students.

DECIMALS

Practice locating decimal numbers on the number line. Students are challenged to "burst" balloons by "throwing" darts at the correct location on the number line. Numbers are entered on a trial-and-error basis. Difficulty adjusts to the student's performance. Designed for elementary math students.

FRENCH VOCABULARY BUILDER

Students are given a basic vocabulary of 500 words including useful verbs, number words, words commonly used in traveling, shopping, in restaurants, or in the home. The format of either "hangperson" or "pyramid building" in structured groups of related words provides students with context and similarity clues to help them increase their proficiency. Designed to supplement introductory-level and refresher courses.

SPANISH VOCABULARY BUILDER

Students are given a basic vocabulary of 500 words including useful verbs, number words, words commonly used in traveling, shopping, in restaurants, or in the home. The format of either "hangperson" or "pyramid building" in structured groups of related words provides students with context and similarity clues to help them increase their proficiency. Designed to supplement introductory-level and refresher courses.

GERMAN VOCABULARY BUILDER

Students are given a basic vocabulary of 500 words including useful verbs, number words, words commonly used in traveling, shopping, in restaurants, or in the home. The format of either "hangperson" or "pyramid building" in structured groups of related words provides students with context and similarity clues to help them increase their proficiency. Designed to supplement introductory-level and refresher courses.

PHYSICS - ELEMENTARY MECHANICS

This is a problem-solving lesson in the elementary mechanics of physics. Students are shown a physical problem and an initial budget of $25. They must "purchase" missing pieces of information required to answer the problem correctly. Once enough information is gathered, the student calculates the answer. The objective is to request the least amount of necessary information to understand the problem, thus "spending" the least amount of money. The emphasis is on understanding the problem, rather than just supplying the correct answers. Designed for senior high physics students.

These lessons have been designed for use by students at specific grade levels, but you don't have to be a student to enjoy these lessons as refresher exercises, skill building tools, or recreation.

DISK REPLACEMENT POLICY

1. Defective disks will be replaced by Control Data Publishing Company, Inc. according to the Control Data Publishing License Agreement.
2. After the warranty period, a replacement disk may be ordered from Control Data Publishing Company, Inc. As of November 1, 1982, the disk replacement fee is $15. This fee is subject to change without notice. All replacement disks are subject to the terms and conditions of the License Agreement.
3. To obtain a replacement disk you may return the flexible disk to the place where you acquired it. If you acquired the flexible disk directly from Control Data, you may return it along with proof of purchase and your check or money order for the disk replacement fee to Control Data at the following address:

   Control Data Publishing Co., Inc.
   Customer Service
   P.O. Box 261127
   San Diego, CA 92126

4. Control Data Publishing Company, Inc. will replace the software disk product only if the terms and conditions of the License Agreement have been met.

NOTES

NOTES

Part Number 15203010